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Principles for Defining Multi-Skilled Jobs Based on Mission Requirements of Multi-Functional Units: The Multi-Skilled Soldier Job Modeler (MJM)

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14. ABSTRACT *(Maximum 200 words)*:
This report discusses principles for identifying and categorizing jobs requiring Multi-Skilled Soldiers (MSS). These principles provide insight to key questions that the Army must answer in developing MSS, including how to define MSS, what operational and organizational objectives are trying to be achieved, how MSS will impact Military Occupational Specialty (MOS) restructuring, among others. This process of identifying job requirements is an important element in the MSS Developmental Blueprint which can be used to define and assess potential MSS implementation and sustainment courses of action. This paper describes concepts for defining unit functional requirements, MSS job requirements, and methods to derive the latter from the former. These are organized into the MSS Job Modeler (MJM). MJM included explicit definitions of unit functional requirements and MSS job requirements. Basic principles for job and task analysis as well as principles attributable to developing MSS are identified. The MSS principles include: defining MSS jobs in terms of tasks, knowledge, skills, and abilities; developing MSS to enhance unit deployability, sustainability, lethality, mobility, and survivability; modifying existing job structures to reflect combined arms units, assessing MSS feasibility in terms of mental and physical workload, and addressing Army wide job structure issues.

15. SUBJECT TERMS
Multi-Skilled Soldier (MSS); objective force; Military Occupational Specialty (MOS); job requirement, MSS developmental blueprint

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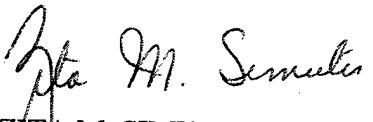
Army Personnel Management
and Support Activities

FOREWORD

The mission of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize individual and unit performance and readiness to meet the full range of worldwide Army missions through advances in the behavioral and social sciences. ARI is the Army's primary laboratory conducting the research and analysis on personnel performance, leader development and training. Its focus is on the human element in the Army with research and analysis that contribute to the entire life cycle of recruiting, selection, assignment, training, and mission performance. ARI also conducts studies and analyses to address short-term issues and respond to emerging "hot topics" and provides technical assistance on critical issues affecting all parts of the Army.

In the spring of 2001, the Personnel Proponency Directorate, Deputy Chief of Staff, Training, U.S. Army Training and Doctrine Command (TRADOC), Fort Monroe, Virginia, asked ARI to analyze the emerging Multi-Skilled Soldier (MSS) Concept, characterized by the Army leadership as a key enabler of the Objective Force (OF). The response was a study effort to develop initial MSS concepts, an MSS Developmental Blueprint with which alternative courses of action could be assessed, a Roadmap identifying major actions required by the Army, and a Study Plan outlining research and analysis projects that would assist most significantly in MSS personnel and training design.

One of the proposed studies was to develop principles for identifying and categorizing jobs requiring multi-skilling. This report discusses principles for defining MSS jobs or Military Occupational Specialties (MOS) based on functional requirements of OF units of action. Principles are discussed for defining unit functional requirements, MSS MOS requirements, and methods for deriving the latter from the former. These principles can be used to meet requirements of the blueprint and its formulation can be used as a model for developing concepts for other key parts of the blueprint. The study findings were briefed to the TRADOC Personnel Proponency Directorate in August 2002.



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PRINCIPLES FOR DEFINING MULTI-SKILLED JOBS BASED ON MISSION REQUIREMENTS OF MULTI-FUNCTIONAL UNITS:
THE MULTI-SKILLED SOLDIER JOB MODELER (MJM)

EXECUTIVE SUMMARY

Study Requirement:

During Fall 2001, the U.S. Army Training and Doctrine Command (TRADOC) sponsored a project by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to explore the nature of the Multi-Skilled Soldier (MSS) Concept and its implications for the Army and specifically for the emerging Objective Force. The project report, The Multi-Skilled Soldier Concept: Considerations for Army Implementation (Nelsen and Akman, 2002), documented the need to develop concepts leading to the eventual development and implementation of MSS as part of the Objective Force. A priority was to develop principles for identifying and categorizing jobs requiring MSS.

Procedure:

The process for developing principles for identifying MSS job requirements involved four elements. First, the MSS Developmental Blueprint was reviewed to identify its information and analytical requirements. Second, principles and procedures for performing job and task analysis were reviewed; these provided basic concepts. Third, operational concepts for the interim and objective forces such as goals for deployability, sustainability, mobility, and survivability, among others, were identified and used to extend traditional job and task analysis methods. Fourth, the principles for identifying MSS job requirements were organized into a conceptual model, the MSS Job Modeler (MJM).

Findings:

Key principles for identifying MSS job requirements include: (1) multi-skilled jobs for analytical purposes can be characterized in terms of tasks, knowledges, skills, or abilities, or combinations thereof; (2) criteria for structuring MSS job requirements are grounded in the Objective Force goal to increase unit deployability, sustainability, lethality, mobility, and survivability; (3) unit functional requirements are derived from the range of military operations, force design, operational and organizational concepts, and military essential collective tasks; (4) multi-skilled jobs are derived from task sets that are distilled from military essential collective tasks; and, (5) multi-skilled job requirements must be consistent with the physical and mental capacity of the Soldier.

Utilization of Findings:

The principles described here can be used by TRADOC to prototype MSS job requirements for Interim and Objective Force units. Additionally, these principles can serve as the basis for developing a guidebook for identifying MSS job requirements as well as a template for the development of other procedures included in the MSS Developmental Blueprint.

PRINCIPLES FOR DEFINING MULTI-SKILLED JOBS BASED ON MISSION REQUIREMENTS OF MULTI-FUNCTIONAL UNITS:
THE MULTI-SKILLED SOLDIER JOB MODELER (MJM)

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Introduction

Background

For several years now, the U.S. Army has been engaged in dialogue and efforts to transform itself into a force capable of meeting requirements across the entire range of military operations that it may face over the next 20-25 years. Its efforts, characterized, in part, by reshaping the current force into a more readily deployable, adaptable Objective Force, are based as well on Soldiers who in the future must have greater deployability, sustainability, lethality, mobility, and survivability. These Soldiers have been called Multi-Skilled Soldiers (MSS).

During Fall 2001, the U.S. Army Training and Doctrine Command (TRADOC) sponsored a project by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to explore the nature of the MSS Concept and its implications for the Army and specifically for the emerging Objective Force. The project report, The Multi-Skilled Soldier Concept: Considerations for Army Implementation (Nelsen and Akman, 2002) (the "Phase I Report"), documented the need to develop concepts leading to the eventual development and implementation of MSS as part of the Objective Force. The report identified more than a hundred actions required by Army leadership, the personnel community, and the training community to develop and implement an MSS concept. The recommended actions included 15 research initiatives.

In Spring 2002, TRADOC resumed its efforts to develop and implement MSS Concepts. Based on the earlier work, four priorities from among the research initiatives were identified for the follow-on effort:

- Formulate prototype MSS Concepts for the Interim Brigade Combat Team (IBCT) [1];
- Develop principles for identifying and categorizing jobs requiring MSS;
- Determine the applicability of MSS to the Interim Force; and
- Develop prototype MSS skill database.

This report documents the results of efforts focused on the second priority. Principles for identifying and categorizing jobs requiring MSS provide a bridge for linking together operational requirements of multi-functional units and the jobs required to be performed by the units' Soldiers.

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[1] During Summer 2002 when this work was being performed, the Interim Brigade Combat Team (IBCT) was re-named the Stryker Brigade Combat Team (SBCT). The examples used here were based on IBCT documentation that may be superseded now or in the future by the SBCT. The authors have chosen to retain the references to "IBCT" since the data may not be current with respect to the SBCT and its continuing development.

The rationale for TRADOC selecting this research initiative as a priority in Phase II is grounded, in part, on the Phase I MSS Study Plan as well as questions raised in that report. Identifying job requirements is a critical, early step in MSS development that needs to be accomplished in order to proceed further. Formulating principles for identifying MSS job requirements provides insight to key questions including:

1. Given that MSS are described variously in terms of tasks, skills, functions, and other characteristics, what terms are most useful for identifying MSS job requirements?
2. Given that Soldiers are already "multi-skilled" in various respects, what is the purpose for expanding the multi-skilled nature of future Army jobs?
3. How does multi-skilling change the approach by which the Army develops and/or restructures its Military Occupational Specialties (MOS)?

TRADOC's interest in job principles derives also from its responsibility as lead agency for implementing selected recommendations of the Army Development System (ADS) XXI Task Force, among others, the recommendation that the Army develop a competency-based MOS system. TRADOC anticipated that principles developed in this current study might be useful in responding to this responsibility. In this context, there is a fourth question of interest.

Can principles for identifying MSS job requirements facilitate development of a competency-based MOS system and, if so, how?

This report has been prepared for TRADOC to be used as a basis for developing a guide for Army personnel planners to define MSS job requirements. Its principles also can be used for prototyping MSS concepts as well as to provide insight to the preceding questions.

Methodology

The approach used to identify and develop principles is based on research and concept development. Focus was on determining how current job and task analysis methods and practices need to be changed in order to accommodate requirements of the MSS Concept. The IBCT was used as a basis for examples related to the principles discussed here. Data were gathered during Summer 2002 from interviews with those involved in developing and fielding the Army's IBCT, including members of the 3rd Brigade, 2nd Infantry Division being stood up at Fort Lewis, WA and others.

IBCT: A Frame of Reference. The IBCT is being created to respond to requirements all along the range of military operations, including Stability and Support Operations (SASO), Small-Scale Conflicts (SSC), and Major Theater War (MTW). The operational objective is to create an organization that is multi-functional, deployable within 96 hours, and capable of immediately beginning operations upon arrival on site.

The IBCT operational and organizational concepts identify job structure goals and requirements. These are shown in Figure 1. To meet requirements of the IBCT and Objective Force, Army job structures must be designed to produce more adaptive Soldiers, among other

goals, across the spectrum of maneuver, maneuver support, and maneuver sustainment. Military occupational specialties (MOS) are to be restructured so that they constitute a set of Army jobs that are more deployable, sustainable, lethal, mobile, and survivable than currently is the case. These attributes are expected to be achieved in a way that results in a smaller footprint in keeping with the operational objective of the IBCT and, in the future, the Objective Force.

Traditional Job and Task Analysis Principles: A Point of Departure for MSS Development. The basis for the job requirements determination methodology developed here is grounded in traditional approaches to job and task analysis, in particular, TRADOC Regulation 350-70, Systems Approach to Training. Although designed primarily for purposes of designing and developing training, its procedures and guidance for performing collective and individual task

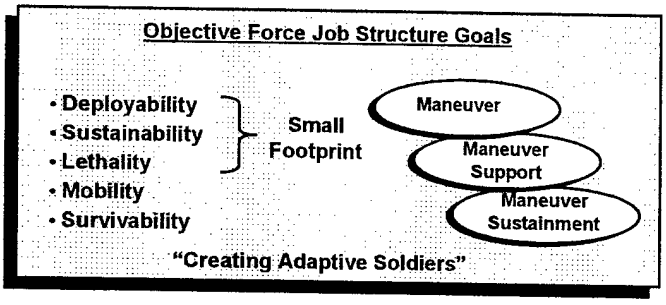

Figure 1. Job structure goals and requirements.

analysis serve as a point of departure. However, just as the MSS Concept has created the expectation that the number and complexity of tasks faced by the MSS will increase, traditional job analysis methods must be extended as well in order to address a broader agenda driven by MSS. Both traditional principles of job and task analysis and new principles required for developing MSS must be addressed.

"Functions" and "Jobs": Basic Concepts. "Jobs" are, in effect, the output of the methods and procedures defined here. "Functions" are the input. The processes and procedures provide a systematic way for translating functions into job requirements. Establishing an understanding of "unit functions" and "multi-skilled jobs", therefore, is the underpinning of the methods and procedures.

"Functions" represent mission essential requirements that are linked to the range of military operations likely to face the U.S. Army in the 21st Century. Interim and Objective Force units are being designed as multi-functional units capable of meeting requirements along a range of military operations. The multi-functional nature of these units can be characterized by their mission essential task lists (METL), which are derived from the units' wartime missions and related tasks in external directives. Examples of IBCT mission essential tasks include: conduct movement to contact and engage enemy fires, among others.

According to TRADOC Regulation 350-70, a "job" is a collection of unique, specific, related set of activities (tasks) performed by a unique, defined set of personnel. "Multi-skilled

jobs", in this context, are jobs having attributes making them more deployable, sustainable, lethal, mobile, and survivable than current jobs.

MSS Job Modeler (MJM). The methods and procedures for translating unit functional requirements into multi-skilled jobs are organized as the MSS Job Modeler (MJM). Figure 2 provides a conceptual view. MJM, at this time, is a conceptual model that can be used by Army personnel planners as a guide for translating unit functional requirements into Soldier job requirements. Units may be at any level from platoon to brigade. Principles for the three key concepts of this model --- the functional requirements (input), the analytical process, and the job requirements (output) --- are described in this report.

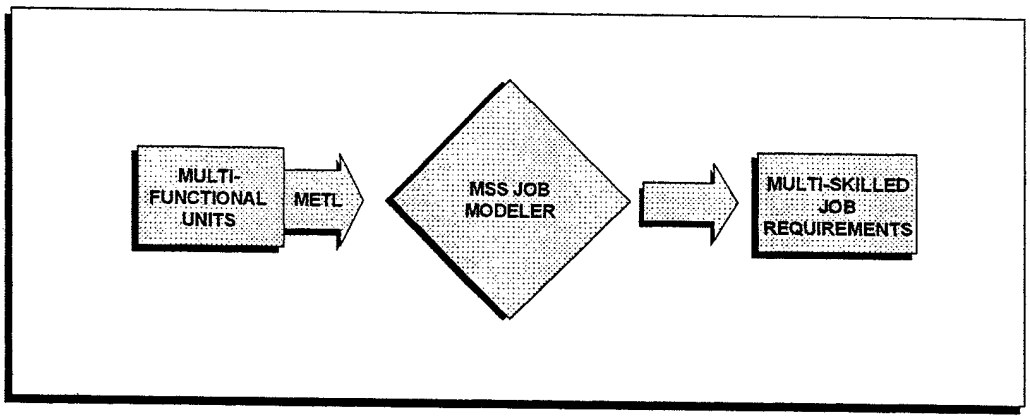

Figure 2. MSS Job Modeler - Basic concept.

The Report's Organization

Six sections comprise this report. First, the MSS Developmental Blueprint is described, as this is the overall analytical and planning framework in which MSS job requirements have to be formulated. Second, basic concepts with respect to MSS and MOS restructuring are addressed. Third, unit functional requirements are discussed conceptually and by example. The concepts establish a standard approach for defining these requirements. The fourth section discusses Soldier job requirements in a similar manner. The fifth section describes procedures for translating the unit functional requirements into MSS job requirements; this is presented as the MSS Job Modeler (or MJM). The final section summarizes the principles for identifying MSS job requirements, provides answers to the questions noted above, and discusses what steps TRADOC can take based on the results of this effort to advance the development of the MSS.

MSS Developmental Blueprint

The MSS Developmental Blueprint was described in the Phase I report as a process by which Army personnel planners and training planners can identify the key issues, elements, tradeoffs, and constraints that require consideration in the development of the MSS. The blueprint, as it presently stands, is largely a framework for analysis. With some exceptions, its components indicate analytical and decision-making requirements but most often do not yet include the procedures or methods by which such requirements may be fulfilled.

MJM is a set of procedures for the portion of the blueprint in which job requirements are defined based on the requirements of multi-functional units. This section provides an overview of the blueprint indicating where MJM fits in the flow of analysis and decisions required to develop and implement an MSS Concept.

Figure 3 identifies the five major components of the blueprint and places MJM in context. The components include force design, MOS design, training design, implementation, and sustainment. The first two components are relevant to MJM and the formulation of principles for defining MSS job requirements. The purpose of the force design component is to translate requirements stemming from the range of military operations that the Army is expected to face in the future into the requirements of multi-functional units. Multi-functional units are future Army organizations designed to respond to the full range of military operations.

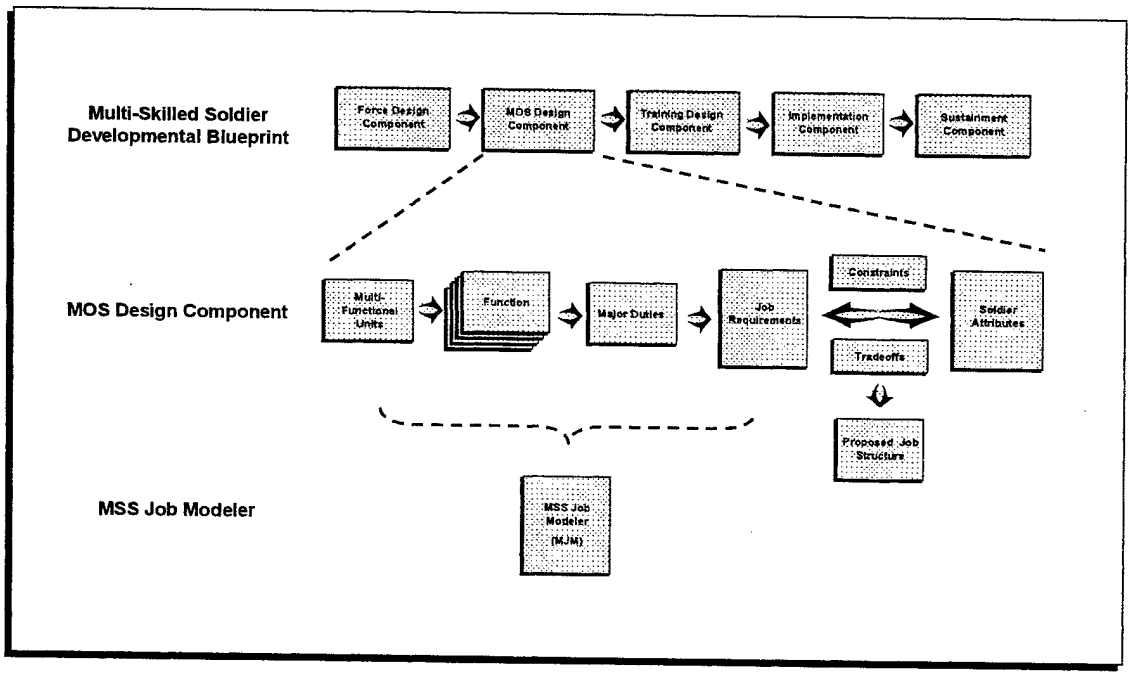

Figure 3. MSS Developmental Blueprint: Context for MJM.

The MOS design component is the element of the blueprint in which unit functional requirements provide the basis for determining an MSS MOS structure. The MOS structure is

determined by analyzing the Soldier requirements and Soldier attributes, i.e., what is needed versus what the Soldier's capable of providing. The Soldier requirements are essentially job requirements.

MJM provides the interface between the unit functional requirements determined in the force design component and the job requirements needed in the MOS design component to derive the MSS MOS structure. Development and specification of MJM here provides the principles for determining MSS job requirements.

The MSS - Definitions and MOS Restructuring

One of the important findings of the Phase I effort was that no standard way of defining MSS has been established. Depending on the circumstances, the MSS has been described as performing additional tasks, as being multi-functional, as having additional skills, and in numerous other ways. In order to formulate principles for identifying job requirements, a commonly understood, accepted definition of the MSS is required. This section documents an MSS concept which is the basis for MJM as well as further development of the MSS Developmental Blueprint. Also, within the context of the MSS definition presented here, the MOS restructuring process is discussed providing further context for principles identifying MSS job requirements.

Defining MSS in Terms of Tasks, Knowledges, Skills, and Abilities

Today's Soldiers are multi-skilled. The Army initiative to develop the MSS Concept is supposed to increase the degree to which Soldiers are multi-skilled. That should lead to an Army comprised of units with smaller footprints that are more deployable, sustainable, lethal, mobile, and survivable.

Nelsen and Akman (2000) documented that the evolving MSS Concept encompasses several notions. These include the additionally skilled Soldier, the generic Soldier, the adaptable Soldier, and the perpetually learning Soldier, among others. In addition to these notions, there are numerous other attributes that are used to describe Soldier jobs or MOS. Figure 4 identifies some of the common ways. These include duties and responsibilities, training, personal attributes, personnel management as well as others.

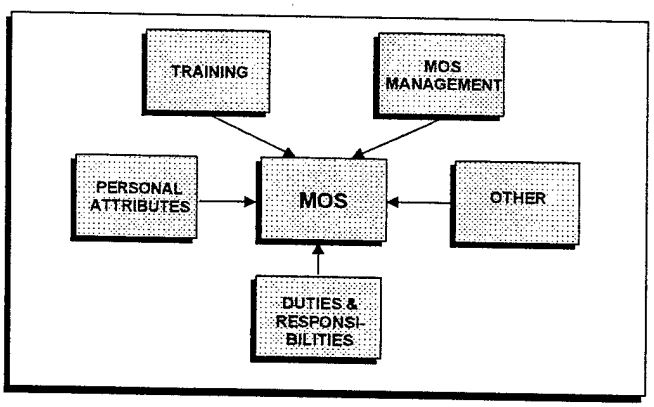

Figure 4. MOS attributes.

Different organizations tend to group and emphasize the various attributes in quite different ways depending on their purpose. Those involved in recruiting, for example, will be concerned by personal attributes, e.g., aptitude, mental category, etc. In order to proceed with the development of an MSS Concept, assess its feasibility for meeting Army objectives, and, if feasible, its implementation, there needs to be a "standard" set of attributes which are the focus of further consideration. For developing and analyzing initial concepts for multi-skilled Soldiers, "duties and responsibilities" is the area of first interest. Subsequently, most of the other

attributes will also draw attention. Figure 5 identifies attributes associated with "duties and responsibilities" which have often been used in discussions of the various MSS notions.

Various descriptions of MSS have emphasized the tasks the Soldiers perform, the skill set the Soldier needs to have, what the Soldier needs to know, i.e., range of knowledge, and what the Soldier is innately capable of doing, i.e., abilities. For purposes of MSS development, the multi-dimensional aspects of the Soldier can be described in terms of tasks, skills, knowledges, or abilities, or combinations thereof. Knowledges, skills, and abilities are generally regarded as enabling the individual to perform tasks. So, in a hierarchical sense, at the highest level, one may focus on MOS, then tasks, then knowledges, skills, or abilities. Insight into the role that the MSS will play in relation to their unit's METL may be gained using one or more of these attributes. Regardless of whether the description highlights multiple tasks, knowledges, skills, or abilities, the Soldier that emerges will be recognized as the MSS.

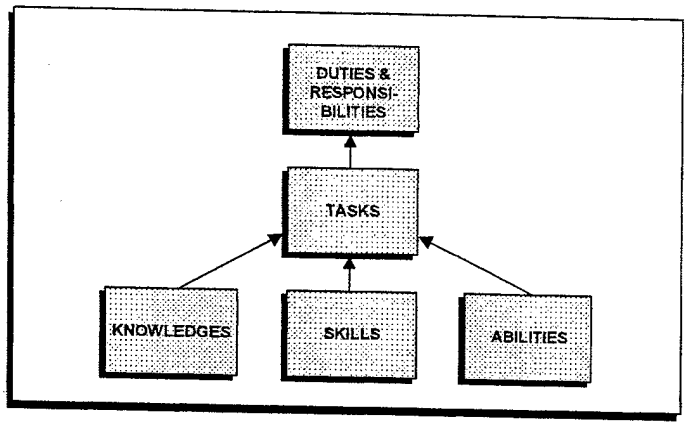

Figure 5. Duties and responsibilities - attributes.

Current MOS are, to some greater or lesser extent, already multi-skilled. The motivation behind the current initiative to restructure MOS and increase their multi-dimensional profile is the belief that greater unit deployability, sustainability, lethality, mobility, and survivability (DSLMS) will result and that the units or organizations to which they belong will have smaller footprints. While this outcome remains to be proven, initially viewing the Soldier through "duties and responsibilities" in terms of tasks, knowledges, and skills will enable the Army to systematically postulate alternative MOS structures that will also provide insight to battlefield performance, training, and other critical issues. Figure 6 summarizes the principles associated with the MSS Concept that underlie MJM formulation.

MSS MOS Restructuring: A Process to Change Current MOS into MSS

MJM has a specific role in the MSS Developmental Blueprint, basically to establish job requirements. The job requirements along with current MOS structures are used in subsequent stages of the blueprint to formulate MSS MOS. While MJM front-ends the MOS Design Component of the blueprint, the MOS restructuring process serves the backend. Here the backend is discussed in order to clarify requirements for the interface between the two processes.

An MOS can be defined as a collection of specific, related set of tasks performed by a defined set of personnel (TRADOC Regulation 350-70). While large portions of MOS tasks are unique, there is some number that is common with one or more other MOS. In fact, there is a large set of common Soldier tasks that all Soldiers are expected to perform. The same can be said for knowledges, skills, and abilities.

MSS Concepts - Principles

- **Current MOS are, to some greater or lesser extent, already multi-skilled.**
- **For purposes of initial conceptual development, the multi-skilled nature of the soldier can be described in terms of tasks, knowledges, skills, and/or abilities.**
- **The Army's goal is to increase units' deployability, sustainability, lethality, mobility, and survivability (DSLMS) and decrease its footprint by restructuring current MOS into MSS MOS.**
- **The aim of the restructuring process is to change the mix of tasks, knowledges, skills, and/or abilities in a way to enhance DSLMS.**
- **While examination of tasks, skills, knowledges, and abilities opens the way to defining the MSS, additional attributes require consideration prior to final MOS structure decisions.**
- **The end-result of the process will be a MSS - that is, a soldier with a different mix of tasks, knowledges, skills, abilities and other attributes than currently.**

Figure 6. MSS concepts - principles.

To restructure MOS into MSS, the tasks, knowledges, skills, and abilities of MOS need to be identified. Task lists exist for all MOS. There are knowledge lists for approximately 25 MOS representing approximately 120,000 authorized Army enlisted Soldiers. There are little skill and ability data. In addition, we need to know how changes in the mix of tasks, knowledges, skills, and/or abilities effect DSLMS. Finally, we need to know what constraints exist, whether policy, budget, human, training, force structure, or others. While restructuring MOS into MSS may be based on these data, before final conclusions are made, consideration of other factors should also be considered.

Figure 7 illustrates a general model for MOS restructuring. There are three elements. On the input side is the current MOS structure including all its characteristics. The output of the process is an MSS MOS structure. Linking the two is an MOS restructuring process.

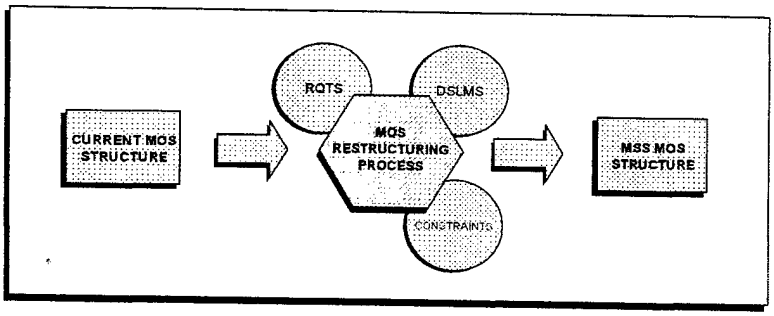

Figure 7. General model: MOS restructuring process.

The current MOS structure is comprised of a number of MOS. Each MOS can be described in terms of one of the key attributes, e.g., tasks. The task structure of current MOS includes MOS-specific tasks and common tasks. The former are tasks that are essentially unique to the particular role and responsibility associated with the MOS. The latter are tasks that all Soldiers are expected to perform. A similar picture could be painted for knowledges or skills. Figure 8 portrays this basic concept.

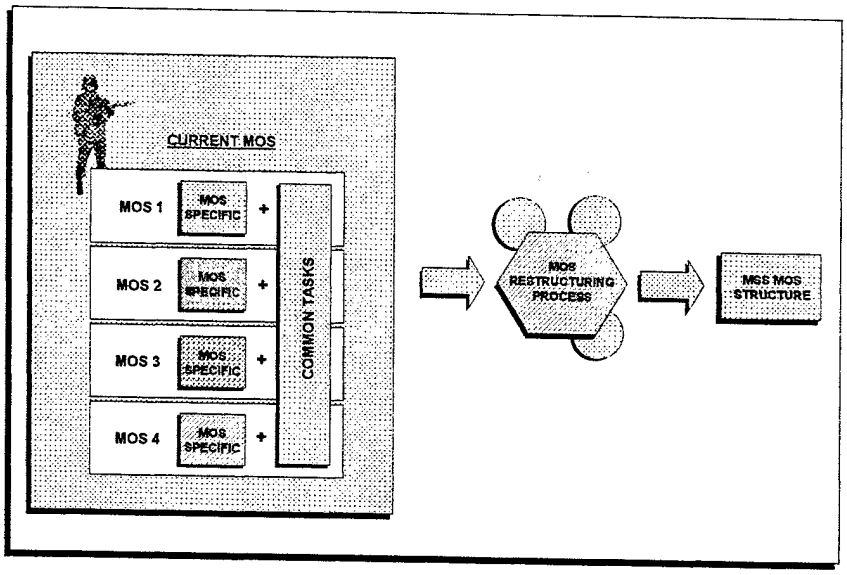

Figure 8. Current MOS structure: A task view.

Figure 9 displays the basic concept underlying the restructuring process. Analysis of an MOS's task structure reveals three types of tasks in addition to Soldier common tasks. Some are MOS-specific, i.e., unique to the particular MOS. Some tasks may be common to the unit. And, some tasks may be shared among some but not all MOS in the unit. The unit common and shared tasks can potentially be redistributed to other MOS. This redistribution needs to occur within the framework of potential changes to DSLMS and other constraints.

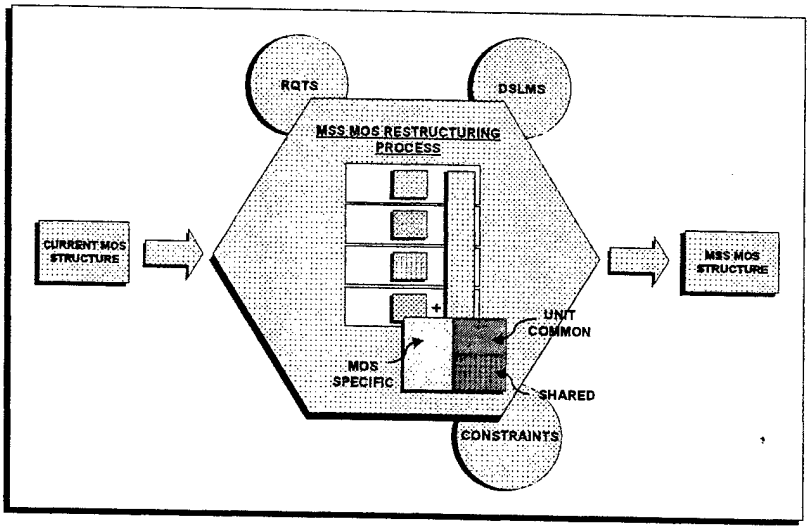

Figure 9. The MSS MOS restructuring process - A task view.

The MOS design objective is to formulate multi-skilled MOS by re-assigning selected tasks, knowledges, skills, and/or abilities which previously were within the exclusive domain of a particular MOS. In the context of developing the MSS Concept, this reassignment should only occur to the extent it leads to units with smaller footprints and with greater DSLMS. If this can be accomplished, the resulting MSS MOS structure may also include fewer MOS.

Figure 10 illustrates the resulting MSS MOS structure. There are potentially fewer MOS. While MOS continue to have MOS specific attributes, they also include shared attributes, attributes common to the unit, as well as Soldier common attributes. As result of the redistribution and expansion of MOS attributes, MOS may include more tasks, more knowledges, more skills, and/or more abilities. The goal is to achieve these changes in a way leading to greater unit DSLMS.

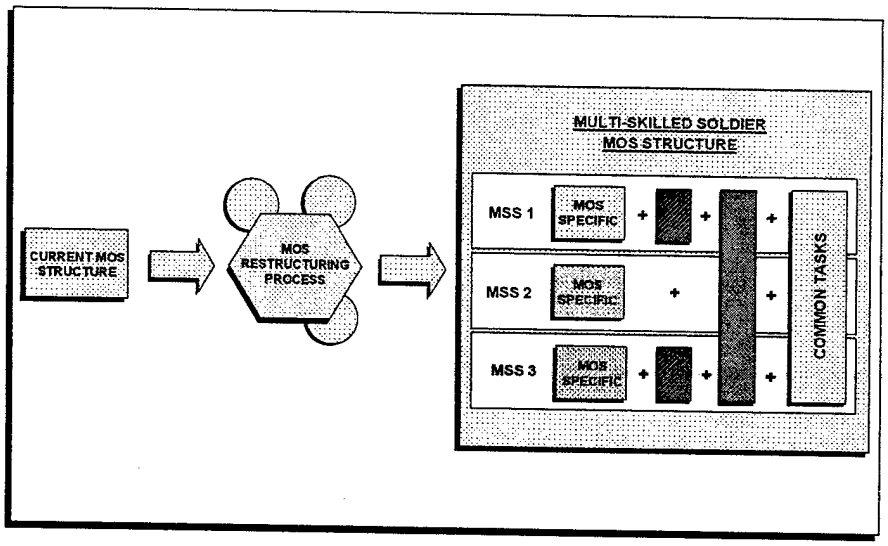

Figure 10. An MOS MSS structure - A task view.

Basic Concepts for Developing MJM

Key principles for developing MJM can be summarized as follows.

- An MSS MOS can be characterized in terms of its tasks, knowledges, skills, or abilities, or combination during its conceptual development.

- The principal criteria for restructuring current MOS into MSS MOS are two-fold:

  - MSS MOS Soldier requirements must be compatible with human dimension of the Soldier;
  - MSS MOS must enhance the DSLMS profile of the Soldier's unit.

MJM Concept: Function

The concept of "function" is the basis for defining jobs in MJM. Simply stated, MJM is designed to answer the basic question: Given the functional requirements of an Army organization, what are the job requirements? The real question MJM is designed to answer is actually more complex because of the scenario for which answers are being sought. In particular, the Army organizations of interest are those emerging as part of the Interim and Objective Forces. And, the jobs of interest are expected to be designed in a way that promotes unit DSLMS.

Formulating a job design procedure such as MJM requires an operational definition of "function". For the definition to be "operational", two conditions must be met. One, the definition needs to include elements that can be used in deriving job requirements. Second, the concept needs to be consistent with Army personnel practices and procedures

In this section, the MJM concept of "function" is developed. Three questions are addressed:

1. What is the MJM definition of "function"?
2. How can "functions" be described?
3. What are examples of "functions"?

MJM Definition of "Function"

There are a variety of potential definitions of "function". In this instance, a definition is required that facilitates the development of methods and procedures for defining MSS based on unit functions of organizations such as the IBCT and its subordinate units.

The IBCT as well as future units of the Objective Force are expected to be multi-functional units. This goal, for example, is well documented in the IBCT Organizational and Operational (O&O) Concept (O&O Concept Final, 30 June 2000). The multi-functionality is, in part, the catalyst for seeking a methodology to relate functional requirements to job structures. In the context of the Interim Force and Objective Force, "function" refers to the capacity of the force units to deal with a range of military operations from stability and support operations (SASO) to small-scale conflicts (SSC) to regional conflicts (RC) to major theater war (MTW). "Functions" at this level of aggregation and with this scope are too far removed from the organization of the Soldier's work or duties to be directly useful in modeling job requirements. Indirectly, the goal underlying such multi-functionality is useful as a characterization of the unit, namely its DSLMS, that the job structure is expected to facilitate.

The Force Design Component of the MSS Developmental Blueprint provides a pathway from the multi-functional nature of Army units embedded in the range of military operations to more narrow concepts. In succession, the blueprint addresses the future operational environment including threats, the operational spectrum, and battlefield requirements, among other matters.

Following this assessment, operational concepts can be formulated. These, in turn, lead to force design, including consideration of unit functions, a second concept of "functions."

"Functions" in this context are documented in the mission essential task list (METL) or centralized training task list (CTTL). Figure 11 indicates these tasks for the IBCT brigade, infantry battalion, and infantry company. These tasks begin to shed light on unit requirements that may be useful in defining job requirements. However, they still require further elaboration to provide sufficient information.

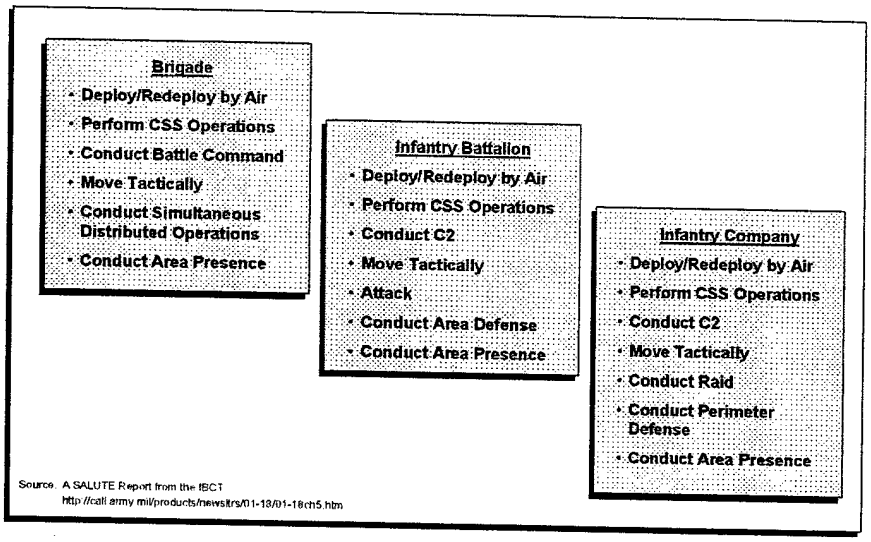

Figure 11. IBCT Centralized Training Task List.

For example, the IBCT Infantry Battalion and Company CTTL task, "Conduct Command and Control", is potentially important in defining job requirements. Its critical nature, however, is more evident when it is recognized that implicit in this task is the IBCT's reliance on the Army Battlefield Combat System (ABCS) systems. Given the role of digital systems are supposed to play in situational awareness and understanding, the CTTL task, by itself, does not inform the process enough until additional detail like the ABCS can be attached to more fully characterize the way in which the unit is expected to perform.

Although the METL or CTTL tasks are not sufficiently detailed for purposes of MJM, they provide a useful reference and can be used as a basis for defining unit tasks at a more discrete and detailed level. The tasks that may be defined by this decomposition represent the "functions" from which job requirements may be derived.

The concept of "collective tasks" as developed in TRADOC Regulation 350-70, Systems Approach to Training (SAT), provides a basis for arriving at a more refined statement of unit functions. According to the regulation, a collective task is:

> A clearly defined, discrete, and measurable activity, action, or event (i.e., task) which requires organized team or unit performance and leads to accomplishment of a mission or function.

A collective task is derived from unit missions or higher level collective tasks. Task accomplishment requires performance of procedures composed of supporting collective or individual tasks. A collective task describes the exact performance a group must perform in the field under actual operational conditions.

The task condition describes the field conditions under which the task will be performed. The condition expands on the information in the task title by identifying when, where, and why the unit performs the task and what materials, personnel, and equipment the unit must have to perform the task. With respect to the level of specification, sufficient detail exists when the collective task has been described so that individual Soldier tasks and equipment can be determined.

Figure 12 summarizes the key elements in the MJM concept of "function". The concept is derivative based on the range of military operations that, through analysis, is translated into unit collective tasks. These tasks essentially represent the "unit functional requirements" for which job requirements must be formulated.

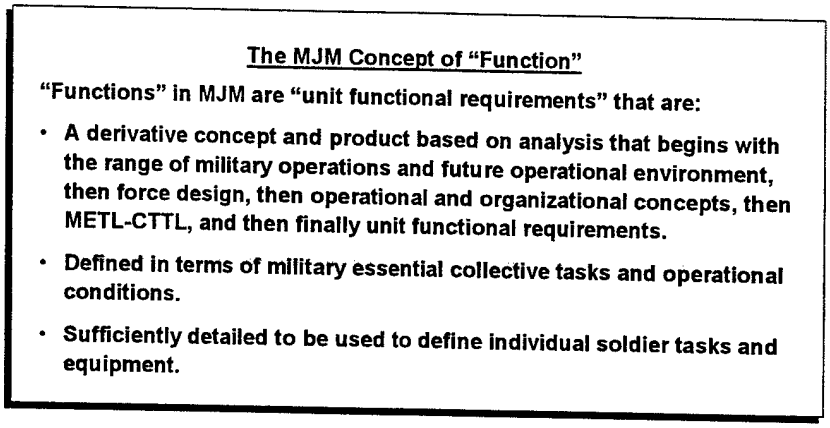

Figure 12. The MJM concept of "Function".

A Process for Defining Unit Functional Requirements

TRADOC Regulation 350-70 outlines an approach for performing mission analysis and critical collective task analysis. FM 25-100, Training the Force, describes the Army's training doctrine and establishes the principle that, since there is not sufficient time and resources to train all collective tasks, units can achieve mission readiness through identification and training of critical unit tasks. While these both are geared towards designing and developing training, they are also suitable as a framework for specifying unit functional requirements for MJM purposes.

Figure 13 illustrates a two-stage approach for defining unit functional requirements, essentially based on the Critical Collective Task Analysis procedure described in TRADOC Regulation 350-70. First, unit missions are defined based on the range of military operations facing the future Army and the role of the unit in relation to higher level and subordinate units.

Second, these missions are analyzed and disaggregated into a set of mission essential collective tasks.

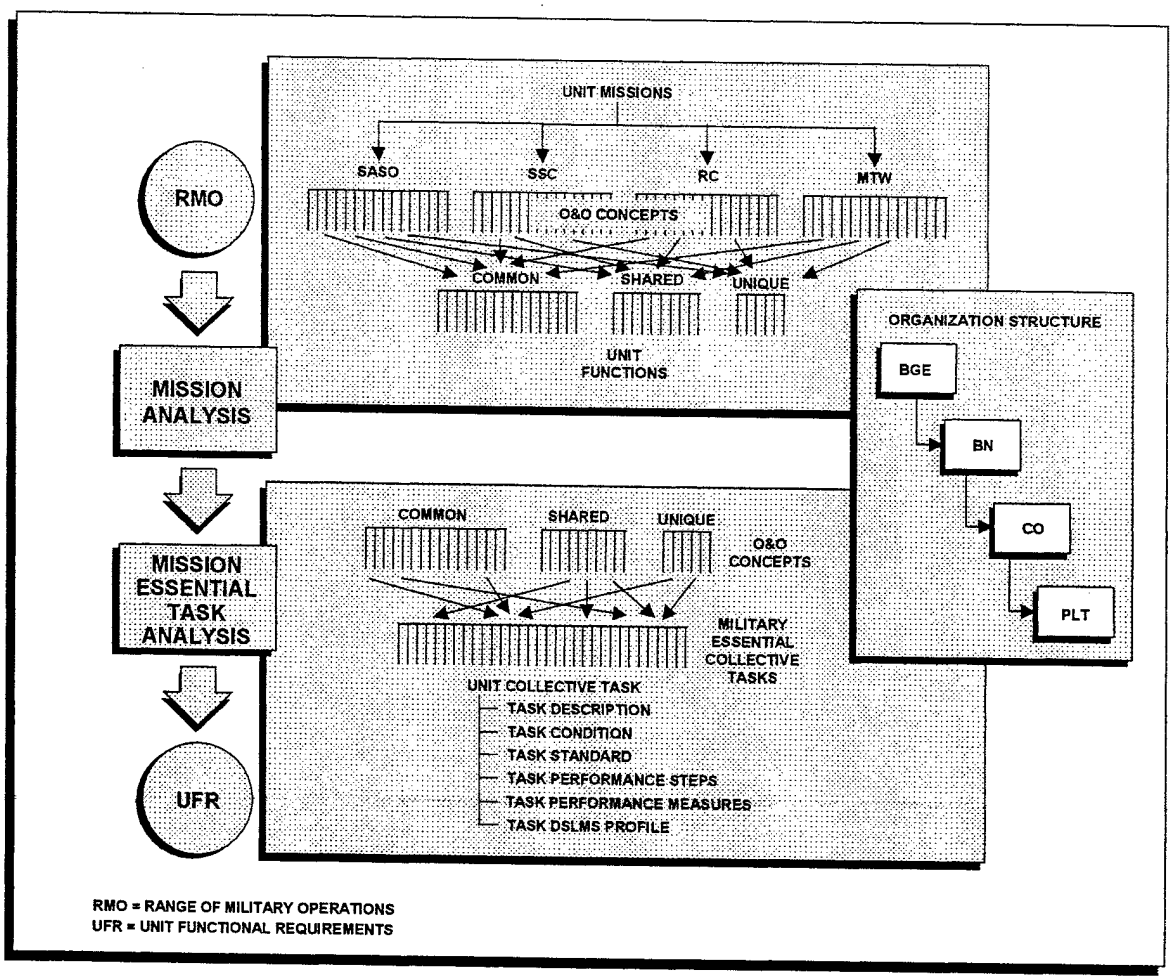

Figure 13. Process for defining unit functional requirements.

The purpose of the mission analysis is to determine a set of unit functions. The process is tailored to incorporate considerations associated with multi-functional units. The range of military operations provides the start point. For each type, for example, SASO, SSC, etc., functions required to perform the unit's mission with respect to each military operation are identified. Once identified for individual missions, these functions are analyzed to determine the extent to which there are common, shared, and unique functions. These constitute the unit's functions.

During the critical task analysis, the second step in the process, the unit functions are analyzed to determine the mission essential collective. These tasks are analyzed in a similar way as the functions to determine common, shared, and unique tasks. Those tasks considered mission essential, i.e., unit performance is essential to completing the mission, are further analyzed and described in terms of its performance steps, conditions, and standards. In addition, the tasks are

rated with respect to their DSLMS impact for the purpose of formulating a baseline DSLMS profile for the unit.

The mission analysis and critical task analysis are overlaid by the organizational structure of the multi-functional unit. Soldiers perform jobs in units that contribute to unit mission and support the missions echelons above. Mission analysis and initial functional analysis focus on large organizations, e.g., the brigade, the battalion, etc., that achieve their missions through their subordinate units. As the organization is decomposed into its subordinate units, functional analysis and mission essential task analysis takes on greater detail and specificity, eventually to the point where Soldier jobs can be identified.

The results from the entire process must be assessed in the context of the unit's relation to higher level and subordinate units as well as augmentations. When this has been completed, a set of unit functional requirements has been formulated. These requirements will subsequently be used as the basis for determining individual tasks and job requirements.

Unit Functional Requirements: An Example Based on the IBCT Infantry Rifle Company

The concepts and procedures for specifying unit functional requirements can be illustrated with examples based on the IBCT infantry rifle company. Following the procedures, first, there needs to be consideration of the range of military operations and the related operational concepts. Second, organizational and operational concepts are used as a reference point for specifying mission essential collective tasks. Finally, characteristics and detail of the collective tasks are developed as the basis for subsequently formulation individual Soldier tasks.

Table 1 lists operational concepts for the IBCT infantry rifle company. These are based on the IBCT organizational and operational concepts. The operational characteristics are tied to the various military operations in which the rifle company will engage. Some are unique to one form of military operation; most are common across the entire range.

Table 2 illustrates a format for documenting mission essential collective tasks based on operational concepts. Some concepts, e.g., operate as combined arms combat organization, characterize the tactical approach of the unit; these do not lead to collective tasks but are significant in formulating force design and individual tasks at later stages in the MJM process.

Figure 14 illustrates the format to be used to document a detailed description of a mission essential collective task. This includes the task title, task purpose, task condition, task standard, task performance steps, and task DLSMS profile, all of which are defined in Figure 15. All the collective tasks taken together would represent the unit functional requirements for the IBCT infantry rifle company. These would be the basis for specifying individual tasks, which subsequently provide the foundation for defining Soldier jobs.

Table 1

IBCT Infantry Rifle Company Operational Requirements

	RMO			
OPERATIONAL CONCEPT	SASO	SSC	RC	MTW
Operate as combined arms combat organization	X	X	X	X
Maintain offensive orientation	X	X	X	X
Achieve tactical decision through dismounted infantry assault	X	X	X	X
Operate in close, complex, or urban terrain	X	X	X	X
Achieve lethality through complement of infantrymen and organic mobility	X	X	X	X
Defeat enemy forces	X	X	X	X
Retain, seize, secure, and control terrain	X	X	X	X
Operate as subordinate unit of its parent battalion	X	X	X	X
Conduct small unit operations (raids, ambushes, patrols, checkpoint, and convoy security operations, etc.)	X			
Operate separate from BN HQ in noncontiguous location	X			
Work with populace within company's AO	X			
Fight alongside mechanized US forces, if augmented				X

Source: O&O Concept Final, 30 June 2000

Table 2

IBCT Infantry Rifle Company Mission Essential Collective Tasks

	OPERATIONAL CONCEPT	MISSION ESSENTIAL COLLECTIVE TASK
COMMON	Operate as combined arms combat organization	
	Maintain offensive orientation	
	Achieve tactical decision through dismounted infantry assault	
	Operate in close, complex, or urban terrain	
	Achieve lethality through complement of infantrymen and organic mobility	
	Defeat enemy forces	
	Operate as subordinate unit of its parent battalion	
SASO Unique	Conduct small unit operations (raids, ambushes, patrols, checkpoint, and convoy security operations, etc.	
	Operate separate from BN HQ in noncontiguous location	
	Work with populace within company's AO	
MTW Unique	Fight alongside mechanized US forces, if augmented	

Source: O&O Concept Final, 30 June 2000

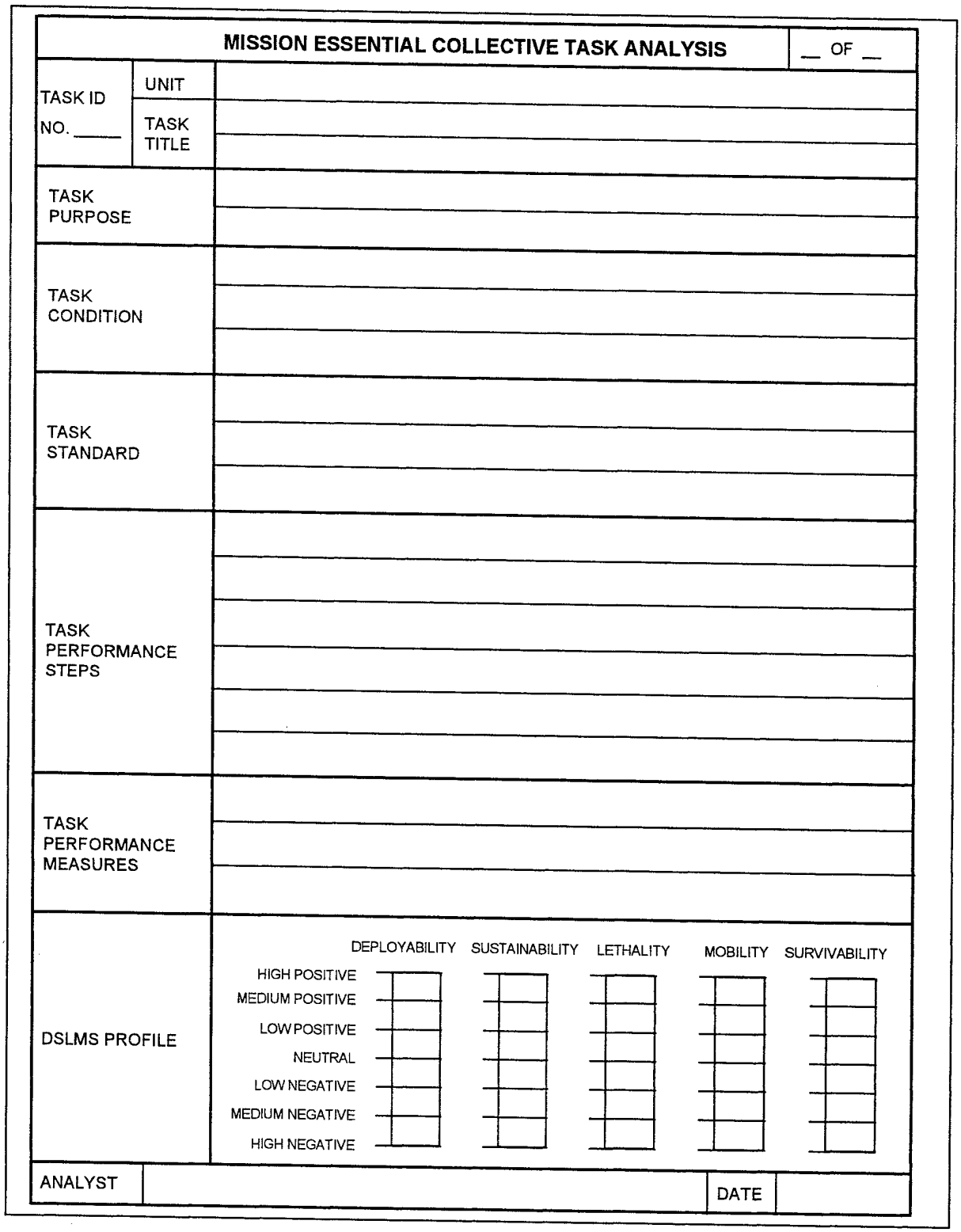

Figure 14. Format for describing mission essential collective task.

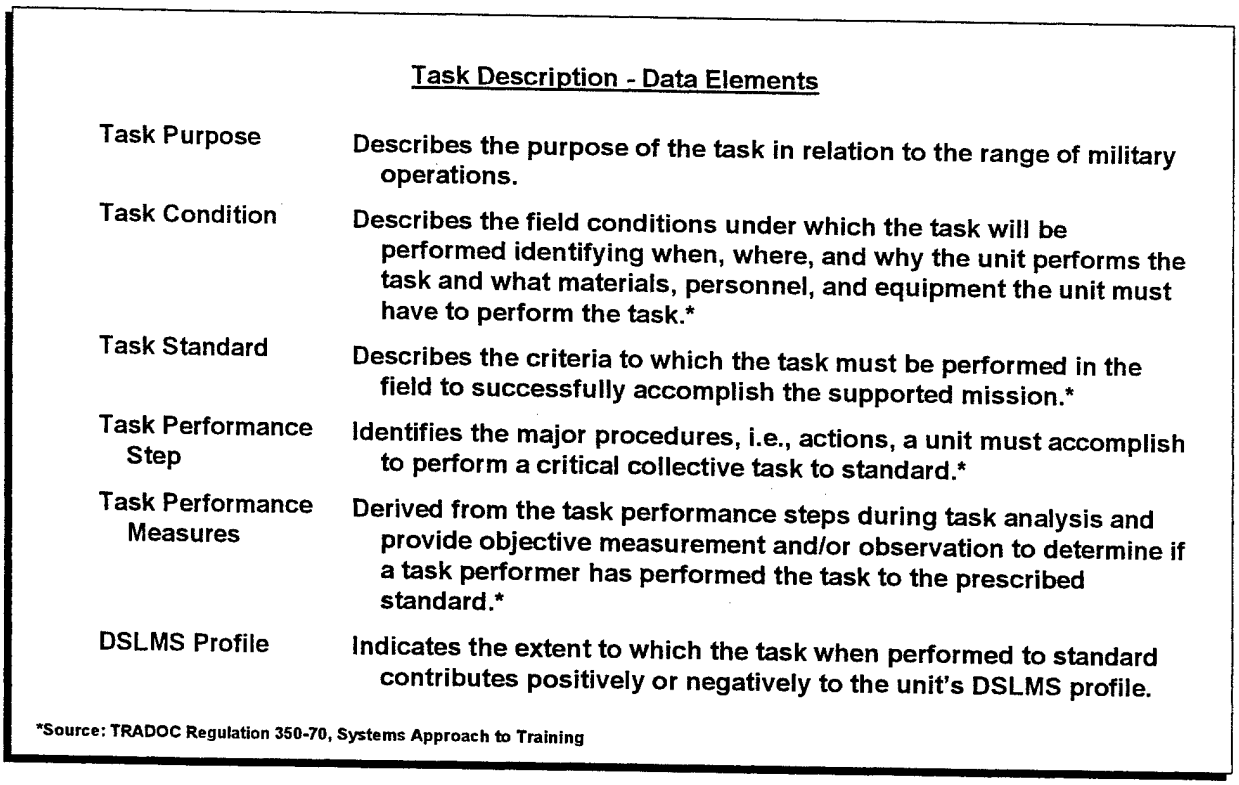

Figure 15. Data elements of the mission essential collective task description.

MJM Concept: Job

The purpose of MJM is to provide an analytical tool that can be used to define job requirements based on unit functional requirements. In the preceding section, the MJM notion of "function" was addressed. This section develops the MJM concept for "job". Since this concept is tailored for purposes of MJM, similar design principles that applied to "function" are relevant for "job". In particular, a "job" concept is needed that facilitates the personnel planning required as part of the Interim and Objective Force development process, that promotes unit DSLMS, and that is operational from the perspective of Army personnel planning practices and procedures.

In developing the MJM concept of "job", three questions are addressed:

1. What is the MJM definition of "job"?
2. How can "jobs" be described?
3. What are examples of "jobs"?

MJM Definition of "Job"

The definition of "job" stated in TRADOC Regulation 350-70 provides a starting point for MJM. A "job" is:

> A collection of unique, specific, related set of activities (tasks) performed by a unique, defined set of personnel.

By MJM's nature, the focus is on the requirements side of the job. The purpose is to define the job requirements, that is, what tasks the Soldier must perform and what the Soldier must know and be able to do in order for the unit to be fully functional and able to achieve its mission(s).

There are two added dimensions in order to address MSS and the DSLMS goals of the Interim and Objective Forces. One is that the job requirement concept include ways to link the characterization of the job based on the TRADOC guidance with the effect that job requirement will ultimately have on the unit DSLMS profile. In this regard, the job requirements may be described in terms of the impact they may have individually on the DSLMS profile. However, DSLMS are attributes of the unit and, while individual Soldiers or jobs have some relevance, the real effect on the unit is a collective effect.

The collective effect has an important implication for the MJM concept of "job". The job and task analysis procedures addressed in TRADOC Regulation 350-70 are designed for the purpose of individual training and, consequently, take on a focus of an individual Soldier job or MOS. For purposes of MJM and the MSS developmental blueprint, the agenda is different. The objective of designing multi-skilled jobs in ways to promote unit DSLMS means that the job requirements must be viewed both individually and collectively. There needs to be ways to examine the joint effects of various job requirements as well as to disaggregate parts of job requirements, i.e., the task elements, and reassemble them into alternative sets of tasks representing different jobs that can still fulfill the unit functional requirements. Consequently, where the TRADOC definition of job addresses a "...related *set* of activities", for purposes of

designing multi-skilled jobs, the process will be facilitated by considering "*sets*" of tasks or activities. Task sets in combination will represent jobs as well as provide a means for creating alternative jobs based on different task set combinations.

Figure 16 summarizes the key elements in the MJM concept of "job". The focus is on the requirements or demand side as distinct from the supply side or Soldier characteristics. The attention to requirements is due only to the role of MJM in the context of the MSS developmental blueprint. The next step would be to balance requirements as defined by MJM against the human dimension represented by the personal traits of Soldiers and recruits.

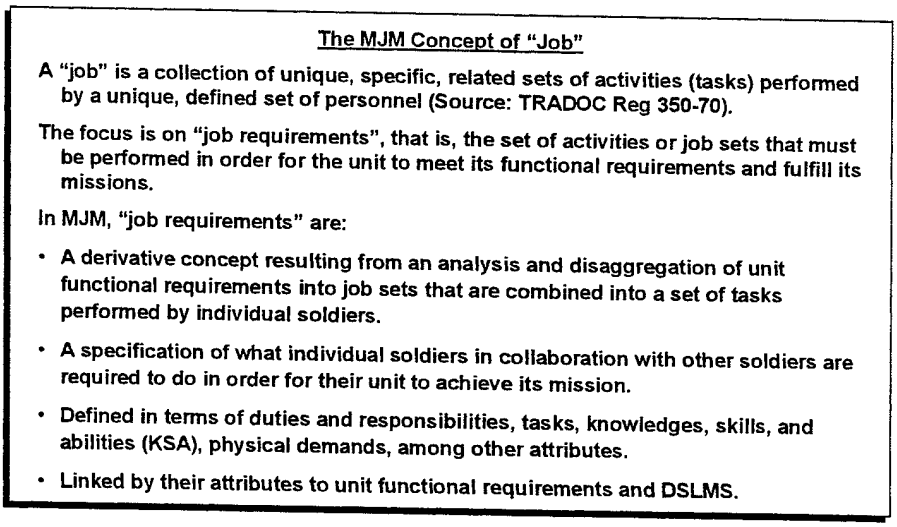

Figure 16. The MJM concept of "Job".

Describing "Jobs"

MJM will produce task sets based on unit functional requirements. Jobs can be defined as combinations of these task sets. Task sets may be unique to a particular job or shared among different jobs. For example, all MOS share task sets that are comprised of common Soldier tasks. On the other hand, a task set consisting of tasks dealing with transport of hazardous material may only be included in a transport MOS. Figure 17 illustrates this concept as well as indicates the types of information used to describe MOS.

There are six categories of descriptive information for each job or MOS, in part corresponding to what is included in MOS descriptions documented in DA Pamphlet 611-21. First, there is a job description. This is a general statement explaining the role of the particular job and the basic duties at each skill level. This would be similar in format to that used in DA Pamphlet 611-21.

Second, the description includes a list of the critical tasks or a subset by skill level. A task is critical if failure to accomplish it would result in adverse effects on the unit functional requirement and the unit's capacity to achieve its mission. Focusing on critical tasks insures that differences and similarities between job sets and MOS are operationally significant. Many MOS

share a set of Soldier tasks, common tasks; these commonalities do not provide insight into the unique elements of the MOS that are at issue when considering how to achieve MSS through restructuring.

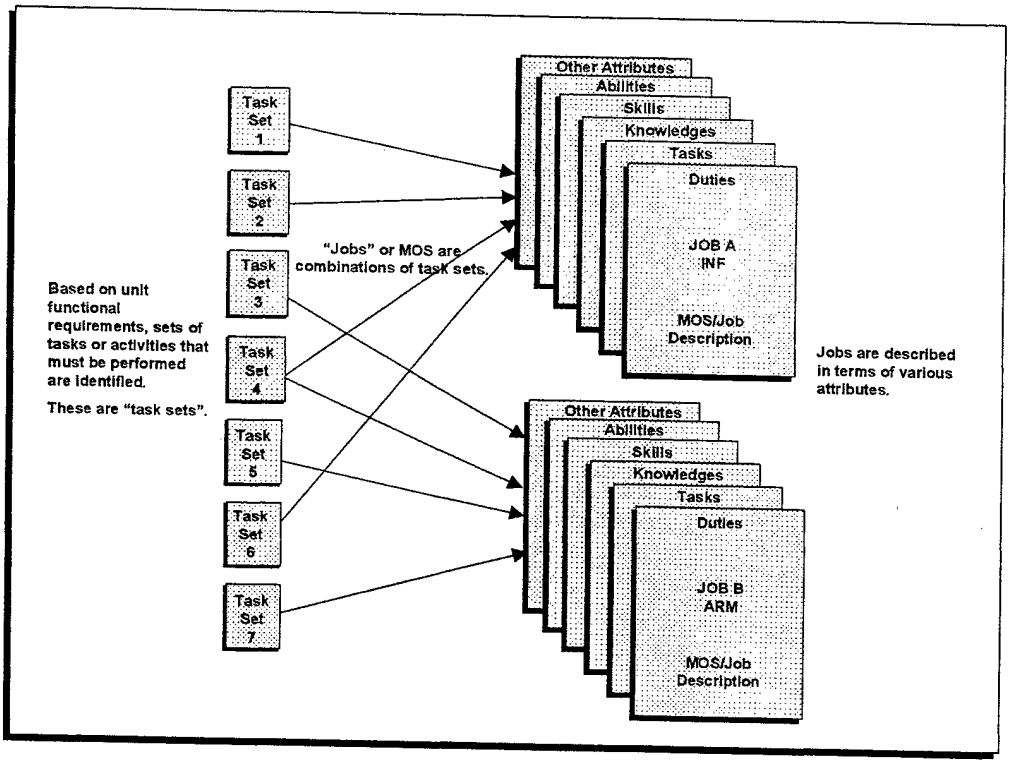

Figure 17. Describing "Jobs".

Third, the description includes a list of knowledges required to perform the critical tasks. "Knowledges" represent information, facts, concepts, or principles that the Soldier needs to know in order to perform the tasks of his MOS. A task may require more than a single knowledge, and a single knowledge may be required for a number of tasks. Knowledges can be taught in the classroom. The knowledges of interest in MJM are those required to perform the critical tasks for the same reason as consideration of common tasks do not facilitate analyzing restructuring options.

Fourth, the job description includes a list of skills required to perform the critical tasks. A "skill" is a developed capacity to perform tasks, predicated, in part on the individual's possession of relevant underlying abilities. Examples of skills include reading comprehension, writing, critical thinking, problem identification, troubleshooting, judgment and decision making, and time management.

Fifth, "ability", an enduring attribute of an individual that influences task performance, is another way of describing a significant aspect of the job. Abilities are regarded as traits in that they exhibit some degree of stability over relatively long periods of time. Examples include oral comprehension, written expression, memorization, manual dexterity, vision, and hearing sensitivity, among others.

Finally, there are a host of other attributes that are important in characterizing jobs and may be useful in developing MSS. These include reading grade level, physical demands, PULHES, gender, tools and test and measurement devices and equipment (TMDE), and other special requirements.

Not necessarily all these categories of information have equal significance in developing MSS concepts. In some respects, the specific categories that receive emphasis will be based on the issues at hand. Generally, however, given MJM's position in the context of the MSS developmental blueprint, tasks, knowledges, skills, and abilities will be the elements of most interest at this stage of MSS development.

Job Requirements: An Example

Task sets, characterized by tasks, knowledges, skills, or abilities, or combinations, may be used to develop concepts of multi-skilled jobs. Figure 18 provides an example of a hypothetical rifle company and how its Soldiers may be made more multi-skilled. Assume that the unit functional requirements have been defined, job sets have been identified, and they have been organized into a set of MOS. In this example, the rifle company has 40 enlisted Soldiers spread across eight MOS. The largest MOS are Infantryman, Mortarman, and Armor numbering 14, 8, and 11 Soldiers, respectively. Other MOS represent specialties including supply, NBC specialist, signal, fire support, and medical.

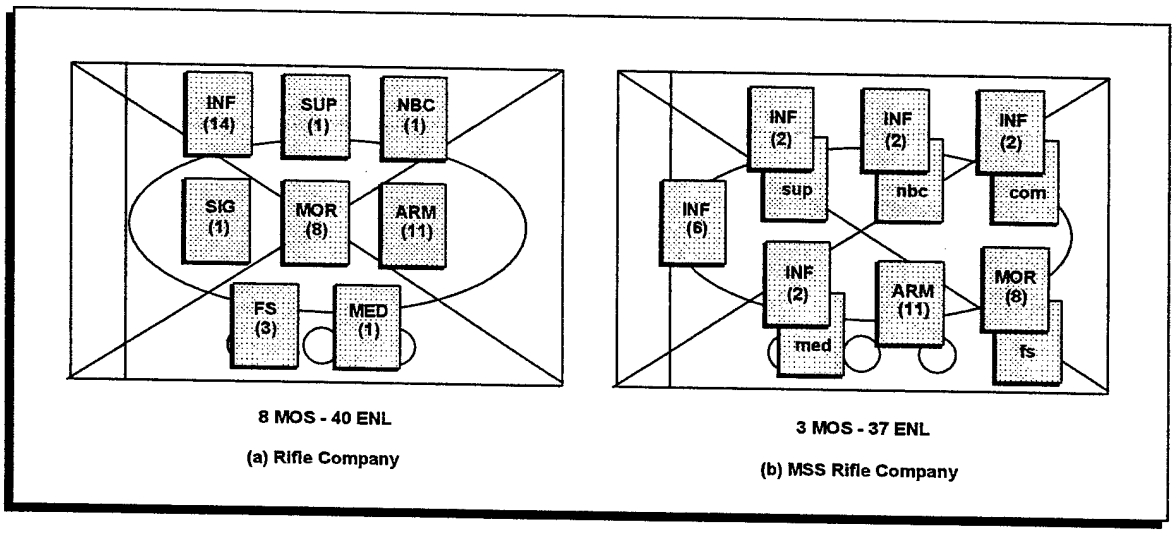

Figure 18. Using job sets to define MSS job requirements: An example.

By examining the task sets of these latter MOS and realigning or reallocating them, the task sets of the larger MOS may be expanded to capture some of the requirements represented by the smaller MOS. Also likely is that, if the smaller MOS are no longer assigned to the unit, their remaining task sets need to find another place to the extent there are still requirements to be met. The resulting MSS rifle company has three MOS with 37 enlisted Soldiers.

The Infantryman MOS, however, has been expanded in multiple ways by attaching additional task sets from specialties no longer included in the rifle company. The attached task sets are identified by lower case letters, e.g., "med" for medical, etc., to suggest that only a subset of the specialist's task sets are attached.

Whether any of this is feasible requires further analysis. The purpose of MJM is to define the job requirement. Having a requirement for MSS that manifests itself in restructured MOS that include task sets from other MOS does not, in and of itself, mean that such MOS serve the best interests of the Soldiers or the Army. Those issues are addressed through other stages of the MSS Developmental Blueprint. For purposes of MJM, there needs to be a concept of "job requirement" and the approach here based on task sets derived from unit functional requirements suffices.

Deriving Job Requirements from Unit Functional Requirements

In preceding sections, unit functional requirements and job requirements have been defined. From the perspective of creating MSS, job requirements are viewed as a derivative or function of the unit functional requirements. How can job requirements be formulated based on unit functional requirements?

This section presents concepts for an analytical process that accomplishes that derivation. First, basic job analysis procedures for deriving jobs as functions of unit missions are described. Second, enhancements to these basic procedures that are required to highlight significant MSS issues are identified. And, finally, aggregation rules enabling the roll-up of unit-based analyses into a Total Army perspective are discussed. The combination of the analytical steps discussed here with the definitions of unit functional requirements and job requirements represents the MSS Job Modeler.

Basic Procedures for Deriving Job Requirements (Stage 1)

The basic process for deriving job requirements is grounded in traditional job task analysis where mission sets are translated into collective tasks which are, in turn, broken into individual tasks. The individual tasks are subsequently organized into task sets that represent jobs. Under normal circumstances this process would be sufficient to identify a basic set of jobs. In the case of developing MSS jobs, however, there are considerations that extend beyond this traditional approach, to a second stage of analysis.

Figure 19 illustrates the basic process, the first stage of analysis. The process begins with the unit functional requirements, which are expressed in terms of military essential collective tasks and operational conditions. The endpoint of this analysis is an initial set of individual jobs, each represented by duties and responsibilities, individual tasks, KSA, and other attributes. This, as noted, is a preliminary result subject to "optimization" in subsequent analysis.

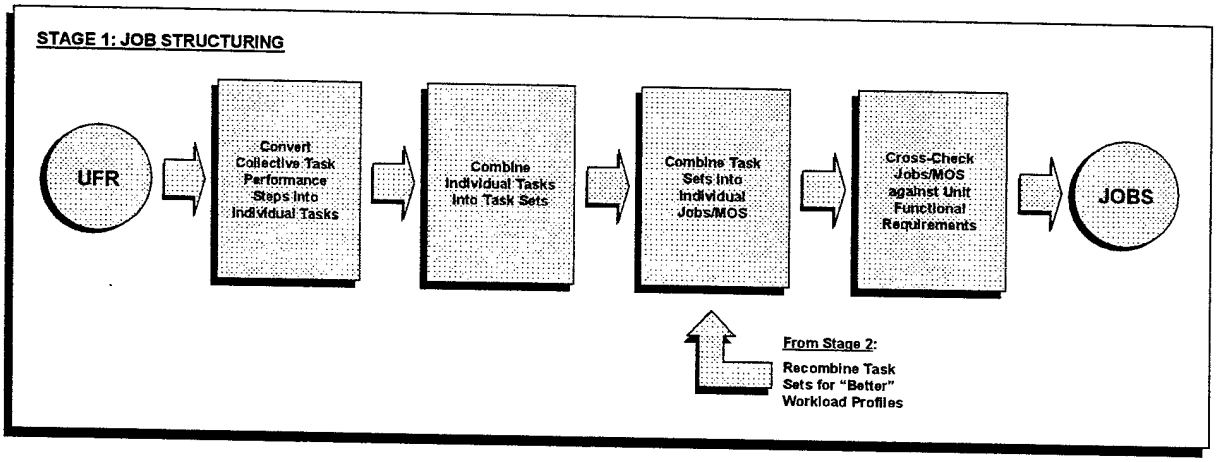

Figure 19. Stage 1: Job structuring.

The process itself involves four steps. First, the collective tasks are converted into individual tasks. Collective task descriptors, particularly task performance steps, provide a point of reference for identifying individual tasks. The result of this first step is a listing of individual tasks that must be performed in order that the unit can fulfill all its missions.

In the second step, the individual tasks are organized into task sets. A task set consists of those tasks which have some commonality in purpose or some logical linkage with one another in terms of performance. As analysis proceeds towards increasing the multi-dimensionality of current jobs or MOS, the task sets are the elements that will be added and removed in order to change job content.

Combinations of task sets constitute individual jobs or MOS. This grouping process is the purpose of the third step. Task sets that reflect some common purpose or other job rationale would be combined. Also, job design goals such as those stemming from Objective Force units of action, for example, would also guide the aggregation process. Task sets may be included in more than one job. For example, there may be a specialized job such as combat medic where the task sets are essentially medical in nature; at the same time, some of the same task sets might be included in an infantry-type job to provide emergency aid on the battlefield. The jobs created in this manner are "notional" jobs, that is, initial job structures subject to further assessments in order to establish their validity.

To complete the initial job structuring, the task content of the notional jobs must be checked against the unit functional requirements to insure that all have been met. This is the fourth step. When this verification is complete, there is an initial set of jobs that can satisfy the unit functional requirements. The job design process is not, however, complete. There are requirements and constraints associated with goals for the Interim and Objective Forces that must be addressed. When these are not met, as indicated in the figure, there is a need to rearrange the task sets into "better" jobs, that is, jobs that do satisfy additional constraints and requirements associated with the MSS.

Procedures for Validating Notional Job Requirements (Stage 2)

Two sets of additional requirements are imposed on MSS jobs. One is DSLMS, essentially the requirement at job structures maximize unit DSLMS. Generally, this requirement means that MSS jobs will tend to be comprised of task sets representing a wider range of duties and responsibilities than has recently been the case. Also, MSS jobs potentially may include task sets that are new as result of new technology such as net-centric command and control and digitalization. To assure that jobs are not being created that exceed the Soldier's capacity to perform effectively, the notional jobs must be analyzed with respect to their workload, both physical and mental. That is the second requirement.

Figure 20 portrays the validation procedure, the second stage of the process for defining multi-skilled job requirements. First, DSLMS is addressed. Based on the set of notional jobs, a DSLMS profile of the unit is developed. This serves as a benchmark which is subsequently used as a reference as the task sets of the notional jobs are adjusted in an effort to improve the

DSLMS profile. A set of multi-skilled jobs result. These jobs cannot be viewed as MSS jobs until the training and workload implications of these jobs are evaluated.

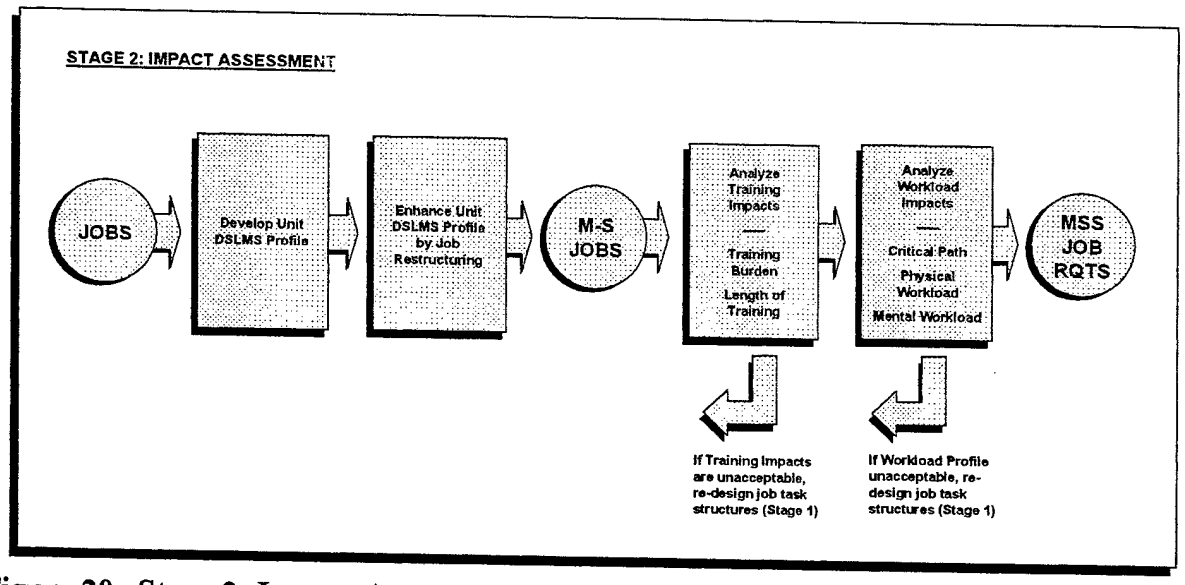

Figure 20. Stage 2: Impact Assessment.

The jobs developed in the first stage are comprised of various task sets, the aim being to combine as many as possible into individual jobs to achieve an enhanced DSLMS profile. Associated with the task sets is a training requirement. While training design and development are addressed in other places in the MSS Developmental Blueprint, there needs to at least be consideration of the training impact of proposed multi-skilled jobs because the Army's training resources are very constrained. Job requirements that significantly lead to increased training burdens, e.g., facilities, training equipment, etc., or increased training lengths are not likely to be feasible. If training impacts are unfavorable, then the combinations of task sets needs to be reconsidered and jobs proposed that have less training consequences.

Critical paths, physical and mental workloads of the multi-skilled jobs also need to be analyzed. These represent potentially significant constraints with respect to the human dimension. Critical paths involve task modeling to insure that the tasks associated with a particular job can be performed in the sequence and timeframe that may be required on the battlefield.

Physical workload entails physical demands, PULHES, and special requirements. In restructuring jobs to achieve better DSLMS, jobs with greater demands generally are being created. The purpose of the physical impact assessment is to insure that the job requirement is compatible with the physical capacity of the Soldier.

In a similar vein, the mental workload is also an issue. As jobs are created with greater demands, there needs to be an assessment of the mental capacity of the Soldier to achieve the required level of performance. Factors include Armed Services Vocational Aptitude Battery (ASVAB) scores, aptitude areas and scores, reading grade level, and the mental capacity of the Soldier to perform at potentially higher levels.

If these assessments indicate that the job requirements have acceptable workloads, there emerges a set of MSS job requirements. These are a set of jobs or MOS that together can satisfy the unit functional requirements. If, on the other hand, the workload assessment indicates that the demands are potentially too great, either physical, mental, or both, then the analysis falls back to the first stage. The initial set of notional jobs must then be redesigned to adjust the workload content so that the requirements are compatible with the human dimension as well as the goals attached to the Objective Force unit of action.

In the context of the MSS Developmental Blueprint, the MSS job requirements resulting from this process will be the input to subsequent analysis. Most immediate will be an assessment of these requirements against the characteristics of the recruit pool and current Soldiers who would be expected to perform in these jobs. To the extent there are disparities between the requirements and the pool of eligible recruits and Soldiers, there may be need for further restructuring within the MJM framework.

The complexity of designing MSS jobs should be evident from the procedures outlined here. There are many dimensions to creating MSS jobs, all of which must be balanced in some way. The fact that these various dimensions are measured in different ways, if measurable at all, adds to the complexity. Nonetheless, the process here provides basic guidance for developing job requirements based on unit functional requirements.

Strategy for Developing Total Army MSS Job Requirements

While the Army pursues the development of MSS, to date whether this involves a single MOS, a group of MOS, or the Total Army has not been established. In making a potentially revolutionary change in Army job structures that the MSS Concept entails, prudence would lead to a focus initially on fewer MOS than all MOS. The process described here provides an approach that involves a few MOS tied to a particular unit.

This approach, if successful, may lead to optimizing a set of MSS MOS for the specific unit under analysis. The MSS MOS solution would potentially be applicable to all similar units. However, this approach may involve suboptimization when extending the MSS Concept to the Total Army.

To expand the unit solution set to higher echelons or the Army at large, additional analysis would be required. As Figure 21 shows, the strategy would encompass four steps.

The first step involves defining the organizational scope to which the MSS concept would be extended. The unit-based analysis discussed earlier would occur for a set of representative units instead of a single unit. The units would be representative to the extent that each is an element to a higher echelon unit that is within the scope of the analysis. The organizational boundary could be defined by a battalion, brigade, or higher level organization. Where the possibility exists for tradeoffs among maneuver, maneuver support, and maneuver sustainment units, a representative set should be included.

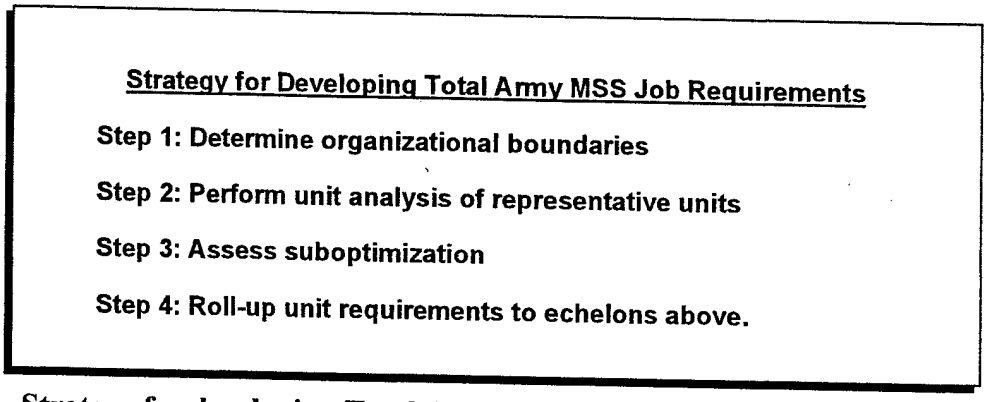

Figure 21. Strategy for developing Total Army MSS job requirements.

For example, suppose as an initial effort MSS job requirements are to be developed for the IBCT, that is, the organizational boundary. Units for which job requirements would be defined would include the infantry battalion, the reconnaissance, surveillance, target acquisition (RSTA) squadron, antitank company, field artillery battalion, brigade support battalion, among others.

Once the units have been identified, the job requirements for each need to be developed. Some job requirements may be duplicated from unit to unit, others may be unique, and others may have similarities permitting them to be combined.

The purpose of the third step is to examine the unit-based job requirements to identify where duplications, overlaps, and inconsistencies exist when the requirements are combined. The aim is to develop a single list of job requirements that can satisfy the unit functional requirements of each unit as well as the organization at large. So, continuing with the example above, the refined set of job requirements would satisfy the needs of the individual units of the IBCT as well as the requirements of the IBCT in the aggregate.

Finally, after the individual requirements have been adjusted to minimize the extent of suboptimization, the requirements would be aggregated to the organization representing the boundary of the analysis. In the case of the example, here, this would be the IBCT. This may still be a suboptimal solution for the Army at large and, if the objective is to reach an Army-wide solution, the process described here would be used in an iterative fashion continuing to aggregate requirements to higher levels until an Army-wide solution is reached.

This description offers an initial formulation of an approach for defining MSS job requirements. Proceeding from these concepts to a procedure useful on an everyday basis will require significant effort. Applying such procedures either to individual units or to units at higher echelons will be complex and difficult. Nonetheless, formalizing a process offers the Army a more systematic way to approach the development of the MSS Concept than to proceed without such paradigms. Implementing the changes that could result from the development of the MSS Concept involves significant risks. Standard methods to structure the decisions and choices can help reduce the negative effects of such risks. The MJM process described here has the potential to serve the Army as a systematic method to address a critical aspect of the MSS Concept development process.

Conclusions

This research has marked an initial effort in developing the MSS Developmental Blueprint. The blueprint itself has many elements covering the gamut from force design to implementation and sustainment of MSS. Its development is one of numerous actions required for implementing the MSS Concept. This effort has identified principles for defining MSS job requirements, provided insight to key questions related to MSS, and laid the foundation for advancing the development of the MSS Concept. This section summarizes the principles, presents answers to the key questions, and addresses the steps ahead.

Principles for Defining Multi-Skilled Jobs Based on Mission Requirements of Multi-Functional Units

The formulation of MJM in terms of jobs, functions, and analysis procedures are based on both basic, longstanding principles of job and task analysis as well as additional principles attributable to MSS requirements. Those principles, discussed throughout the preceding sections of this report, are summarized here.

Basic Job and Task Analysis Principles. There are three basic principles, listed in Figure 22, underlying the process for developing MSS job requirements and MJM. These are, as has been noted previously, based on TRADOC Regulation 350-70, and are consistent with standard job and task analysis practices.

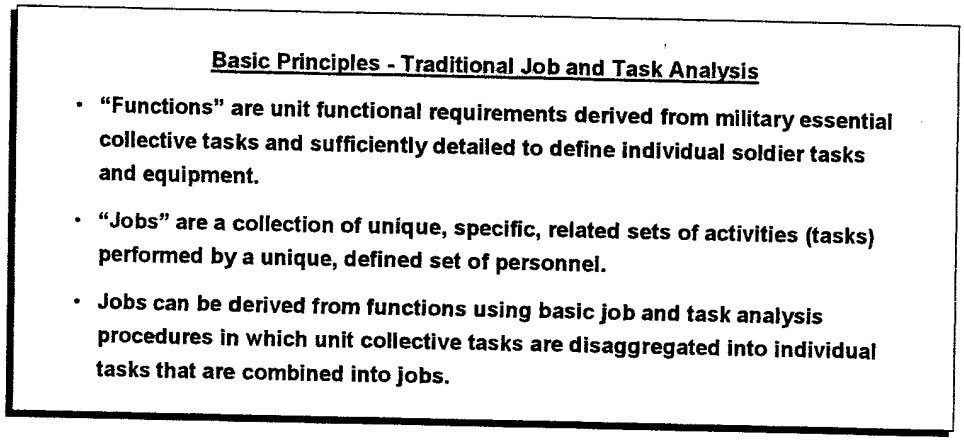

Figure 22. Basic principles -Traditional job and task analysis.

MSS Job and Task Analysis Principles. Ordinarily, the basic principles listed above and discussed throughout this report would be sufficient for developing job requirements. However, given the goal to create MSS, there are additional principles. These generally reflect the added complexity and risk associated with potentially expanding Soldier job performance as well as significant organizational and operational objectives attendant with the Interim and Objective Forces. Figure 23 lists six additional principles which, together with the basic principles, represent a set of principles for defining multi-skilled jobs based on the mission requirements of multi-functional units.

MSS Job and Task Analysis Principles

- MSS jobs can be described in terms of tasks, knowledges, skills, and/or abilities, or any combination thereof; the soldier that emerges will be recognized as multi-skilled.
- Soldier jobs that have increased multi-dimensional content will contribute to creating units with greater deployability, sustainability, lethality, mobility, and survivability (DSLMS) and with smaller footprints.
- The multi-skilled nature of soldier jobs can be created by attaching additional sets of tasks, knowledges, skills, and/or abilities to the soldier's current set.
- The Interim Force and Objective Force goals for combined arms units requires consideration of cross-branch as well as within-branch migration of task or KSA sets.
- Because of the added complexity and demands on future soldier jobs due to multi-skilling as well as other factors, analysis of mental and physical workloads are critical elements in MSS job analysis.
- Creating MSS inherently has impact beyond a single MOS to all unit MOS therefore requiring consideration of the impact across all or a wide portion of the MOS structure.

Figure 23. MSS job and task analysis principles.

Answering MSS Questions

These six principles provide insight to the questions raised in the Introduction of this report.

1. Given that MSS are described variously in terms of tasks, skills, functions, and other characteristics, what terms are most useful for identifying MSS job requirements?

The multi-skilled nature of jobs can be described in terms of tasks, knowledges, skills, and abilities, or any combination thereof. Regardless of which attribute(s) are used, the job described will be recognized as multi-skilled. As noted, there are many other attributes that ultimately may be important in developing MSS. However, for purposes of the initial specification of MSS jobs, tasks and KSA are terms with which personnel planners and training developers have great familiarity.

2. Given that Soldiers are already "multi-skilled" in various respects, what is the purpose for expanding the multi-skilled nature of future Army jobs?

The purpose for expanding the multi-skilled nature of future Army jobs is to increase unit deployability, lethality, sustainability, mobility, and survivability, i.e., the unit DSLMS profile, while achieving a smaller footprint. This provides the criteria for

increasing the multi-skilled nature of the Soldier. The objective is to increase the tasks or KSA associated with Army jobs in ways resulting in enhanced unit DSLMS.

3. How does multi-skilling change the approach by which the Army develops and/or restructures its Military Occupational Specialties (MOS)?

Traditional job and task analysis has to be extended in three key respects. First, the objectives for job design must include enhancing the unit DSLMS profile. Second, in order to avoid sub-optimal solutions, identification of job requirements must include all jobs associated with the unit and, ultimately, all Army jobs. Third, owing to the added complexity and demands of future Soldier jobs due to multi-skilling, analyses of mental and physical workloads, training load, and critical paths are important parts of the process.

4. Can the principles for identifying MSS job requirements facilitate development of a competency-based MOS system and, if so, how?

Implicit in the idea of developing a competency-based MOS system, as recommended by the ADS XXI Task Force, is the notion that future Army job classification needs to reach beyond current job criteria and identify the competencies required to perform Army jobs. The principle that MSS jobs can be described in terms of tasks, knowledges, skills, and/or abilities, or any combination provides the basis for depicting MSS jobs in terms of competencies. This is a foundation upon which to devise a new MOS system. Additional design considerations for a competency-based system can be derived from other principles related to combined arms requirements, mental and physical workloads, and the DSLMS profile. In sum, the principles outlined in this report can be used as the basis for key design parameters of a competency-based MOS system.

Next Steps: Building on these Principles

The findings and results discussed in this report can be used in three ways:

- To formulate prototype MSS job requirements for the IBCT and other Interim and Objective Force units;
- To develop a procedural guidebook for determining MSS job requirements;
- To develop concepts for other key elements of the MSS Developmental Blueprint.

The principles for identifying MSS job requirements can be used as the basis for formulating prototype MSS job requirements for the IBCT and other Interim and Objective Force units. As the principles indicate, the process would entail identifying the unit METL, determining the unit's DSLMS profile, and identifying unit jobs. The last step begins in basic job and task analysis and extends to additional considerations including assessment of DSLMS impact, unit-wide job mix, and workload assessments as prescribed by the MJM principles. These essentially provide a roadmap for developing prototype MSS concepts.

The principles and related concepts discussed here may also be proceduralized into a guidebook that can be used by Army personnel planners and others tasked with identifying job requirements in the Interim and Objective Force environments. Transforming the principles discussed in this research report, the guidebook would provide step-by-step procedures.

Finally, while the approach to developing principles applies to a particular part of the MSS Developmental Blueprint, other blueprint elements require similar definition and development. This report has focused on identifying principles for identifying MSS job requirements in a manner that can be used for developing a procedural guidebook. This same approach can be used to define and develop other parts of the blueprint as well.

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APPENDIX A

LIST OF ABBREVIATIONS AND ACRONYMS

ABCS	Army Battlefield Combat System
ADS	Army Development System
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ARM	Armor
ASVAB	Armed Services Vocational Aptitude Battery
COM	Communications
CTTL	Centralized Training Task List
DSLMS	Deployability, Sustainability, Lethality, Mobility, and Survivability
FS	Fire Support
IBCT	Interim Brigade Combat Team
INF	Infantry
KSA	Knowledge, Skill, and Ability
MED	Medical
METL	Mission Essential Task List
MJM	Multi-Skilled Soldier Job Modeler
MOR	Mortar
MOS	Military Occupational Specialty
MSS	Multi-Skilled Soldier
MTW	Major Theater War
NBC	Nuclear, Biological, and Chemical
O&O	Organizational and Operational
OF	Objective Force
PULHES	Physical, Upper Extremities, Lower Extremities, Hearing, Eyes, Psychiatric
RC	Regional Conflict
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SASO	Stability and Support Operations
SAT	Systems Approach to Training
SBCT	Stryker Brigade Combat Team
SSC	Small-Scale Conflicts
SUP	Supply
TMDE	Test and Measurement Devices and Equipment
TRADOC	U.S. Army Training and Doctrine Command